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THE

ASSURANCE MAGAZINE,

AND

JOURNAL

OF THE

INSTITUTE OF ACTUARIES.

A Budget of Paradoxes. *By* PROFESSOR DE MORGAN.

(Continued from page 150.)

No. IV. 1660—1668.

Examinatio et emendatio Mathematicæ Hodiernæ. By Thomas Hobbes. London, 1660, 4to.

In six dialogues: the sixth contains a quadrature of the circle. But there is another edition of this work, without place or date on the title-page, in which the quadrature is omitted. This seems to be connected with the publication of another quadrature, without date, but about 1670, as may be judged from its professing to answer a tract of Wallis, printed in 1669. The title is *Quadratura circuli, cubatio sphæræ, duplicatio cubi,* 4to. Hobbes, who began in 1655, was very wrong in his quadrature; but, though not a Gregory St. Vincent, he was not the ignoramus in geometry that he is sometimes supposed. His writings, erroneous as they are in many things, contain acute remarks on points of principle. He is wronged by being coupled with Joseph Scaliger, as the two great instances of men of letters who have come into geometry to help the mathematicians out of their difficulty. I have never seen Scaliger's quadrature, except in the answers of Adrianus Romanus, Vieta and Clavius, and in the extracts of Kastner. Scaliger had no right to such strong opponents: Erasmus or Bentley might just as well have tried the problem, and either would have done much better in any twenty minutes of his life.

Scaliger inspired some mathematicians with great respect for his geometrical knowledge. Vieta, the first man of his time, who answered him, had such regard for his opponent as made him conceal Scaliger's name. Not that he is very respectful in his manner of proceeding: the following dry quiz on his opponent's logic must have been very cutting, being true. "In grammaticis, dare navibus Austros, et dare naves Austris, sunt æque significantia. Sed in Geometricis, aliud est adsumpsisse circulum BCD non esse majorem triginta sex segmentis BCDF, aliud circulo BCD non esse majora triginta sex segmenta BCDF. Illa adsumptiuncula vera est, hæc falsa." Isaac Casaubon, in one of his letters to De Thou, relates that, he and another paying a visit to Vieta, the conversation fell upon Scaliger, of whom the host said that he believed Scaliger was the only man who perfectly understood mathematical writers, especially the Greek ones: and that he thought more of Scaliger when wrong than of many others when right; pluris se Scaligerum vel errantum facere quam multos κατορϑοῦντας. This must have been before Scaliger's quadrature (1594). There is an old story of some one saying, "Mallem cum Scaligero errare, quam cum Clavio recte sapere." This I cannot help suspecting to have been a version of Vieta's speech, with Clavius satirically inserted, on account of the great hostility which Vieta showed towards Clavius in the latter years of his life.

Montucla could not have read with care either Scaliger's quadrature or Clavius's refutation. He gives the first a wrong date: he assures the world that there is no question about Scaliger's quadrature being wrong, in the eyes of geometers at least: and he states that Clavius mortified him extremely by showing that it made the circle less than its inscribed dodecagon, which is, of course, equivalent to asserting that a straight line is not always the shortest distance between two points. Did *Clavius* show this? No, it was Scaliger himself who showed it, boasted of it, and declared it to be a "noble paradox" that a theorem false in geometry is true in arithmetic; a thing, he says with great triumph, not noticed by Archimedes himself! He says in so many words that the periphery of the dodecagon is greater than that of the circle; and that the more sides there are to the inscribed figure, the more does it exceed the circle in which it is. And here *are* the words, on the independent testimonies of Clavius and Kastner:—

"Ambitus dodecagoni circulo inscribendi plus potest quam circuli ambitus. Et quanto deinceps plurium laterum fuerit polygonum circulo inscribendum, tanto plus poterit ambitus polygoni quam ambitus circuli."

There is much resemblance between Joseph Scaliger and William Hamilton, in a certain impetuosity of character, and inaptitude to think of quantity. Scaliger maintained that the arc of a circle is less than its chord in arithmetic, though greater in geometry; Hamilton arrived at two quantities which are identical, but the greater the one the less the other. But, on the whole, I liken Hamilton rather to Julius than to Joseph. On this last hero of literature I repeat Thomas Edwards, who says that a man is unlearned who, be his other knowledge what it may, does not understand the subject he writes about. And now one of many instances in which literature gives to literature character in science. Anthony Teissier, the learned annotator of De Thou's biographies, says of Finæus, "Il se vanta sans raison avoir trouvé la quadrature du cercle; la gloire de cette admirable découverte était réservée à Joseph Scaliger, comme l'a écrit Scévole de St. Marthe."

Natural and Political Observations....upon the Bills of Mortality. By John Graunt, citizen of London. London, 1662, 4to.

This is a celebrated book, the first great work upon mortality. But the author, going *ultra crepidam*, has attributed to the motion of the moon in her orbit all the tremors which she gets from a shaky telescope. But there is another paradox about this book: the above absurd opinion is attributed to that excellent mechanist, Sir William Petty, who passed his days among the astronomers. Graunt did not write his own book! Anthony Wood hints that Petty "assisted, or put into a way" his old benefactor: no doubt the two friends talked the matter over many a time. Burnet and Pepys state that Petty wrote the book. It is enough for me that Graunt, whose honesty was never impeached, uses the plainest incidental professions of authorship throughout; that he was elected into the Royal Society because he was the author; that Petty refers to him as author in scores of places, and published an edition, as editor, after Graunt's death, with Graunt's name of course. The note on Graunt in the *Biographia Britannica* may be consulted; it seems to me decisive. Mr. W. B. Hodge, an able actuary, has done the best that can be done on the other side in the *Assurance Magazine*, viii. 234. If I may say what is in my mind, without imputation of disrespect, I suspect some actuaries have a bias: they would rather have Petty the greater for their Coryphæus than Graunt the less.

Pepys is an ordinary gossip: but Burnet's account has an animus which is of a worse kind. He talks of "one Graunt, a Papist, under whose name Sir William Petty published his observations on the bills of mortality." He then gives the cock without a bull story of Graunt being a trustee of the New River Company, and shutting up the cocks and carrying off their keys, just before the fire of London, by which a supply of water was delayed. It was one of the first objections made to Burnet's work, that Graunt was *not* a trustee at the time; and Maitland, the historian of London, ascertained from the books of the Company that he was not admitted until twenty-three days after the breaking out of the fire. Graunt's first admission to the Company took place on the very day on which a committee was appointed to inquire into the cause of the fire. So much for Burnet. I incline to the view that Graunt's setting London on fire strongly corroborates his having written on the bills of mortality: every practical man takes stock before he commences a grand operation in business.

De Cometis: or a discourse of the natures and effects of Comets, as they are philosophically, historically, and astrologically considered. With a brief (yet full) account of the III late Comets, or blazing stars, visible to all Europe. And what (in a natural way of judicature) they portend. Together with some observations on the nativity of the Grand Seignior. By John Gadbury, Φιλομαϑηματικός. London, 1665, 4to.

Gadbury, though his name descends only in astrology, was a well-informed astronomer. D'Israeli sets down Gadbury, Lilly, Wharton, Booker, &c., as rank rogues: I think him quite wrong.

An essay towards a real character and a philosophical language. By John Wilkins [Dean of Ripon, afterwards Bishop of Chester]. London, 1668, folio.

This work is celebrated, but little known. Its object gives it a right to a place among paradoxes. It proposes a language—if that be the proper name—in which *things* and their relations shall be denoted by signs, not *words:* so that any person, whatever may be his mother tongue, may read it in his own words. This is an obvious possibility, and, I am afraid, an obvious impracticability. One man may construct such a system—Bishop Wilkins has done it—but where is the man who will learn it? The second tongue makes a language, as the second blow makes a fray. There has been very little curiosity about his performance, the work is scarce, and I do not know where to refer the reader for any account of its details, except to the partial reprint of Wilkins presently mentioned under 1802, in which there is an unsatisfactory abstract. There is nothing in the *Biographia Britannica* except discussion of Anthony Wood's statement that the hint was derived from Dalgarno's book, *De Signis*, 1661. Hamilton (*Discussions*, art. 5, "Dalgarno") does not say a word on this point, beyond quoting Wood; and Hamilton, though he did now and then write about his countrymen with a rough-nibbed pen, knew perfectly well how to protect their priorities.

Problema Austriacum. Plus ultra Quadratura Circuli. Auctore P. Gregorio a Sancto Vincentio Soc. Jesu. Antwerp, 1647, folio. —Opus Geometricum posthumum ad Mesolabium. By the same. Gandavi (Ghent), 1668, folio.

The first book has more than 1,200 pages, on all kinds of geometry. Gregory St. Vincent is the greatest of circle-squarers, and his investigations led him into many truths: he found the property of the area of the hyperbola which led to Napier's logarithms being called *hyperbolic.* Montucla says of him, with sly truth, that no one has ever squared the circle with so much genius, or, excepting his principal object, with so much success. His reputation, and the many merits of his work, led to a sharp controversy on his quadrature, which ended in its complete exposure by Huyghens and others.

Renati Francisci Slussii Mesolabum. Leodii Eburonum [Liege], 1668, 4to.

The Mesolabum is the solution of the problem of finding two mean proportionals, which Euclid's geometry does not attain. Slusius is a true geometer, and uses the ellipse, &c.: but he is sometimes ranked with the trisectors, for which reason I place him here, with this explanation.

The finding of two mean proportionals is the preliminary to the famous old problem of the duplication of the cube, proposed by Apollo (not Apollonius) himself. D'Israeli speaks of the "six follies of science,"—the quadrature, the duplication, the perpetual motion, the philosopher's stone, magic, and astrology. He might as well have added the trisection, to make the mystic number seven: but had he done so, he would still have been very lenient; only seven follies in all science, from mathematics to chemistry! Science might have said to such a judge—as convicts used to say who got seven years, expecting it for life, "Thank you, my Lord, and may you sit there till they are over,"—may the Curiosities of Literature outlive the Follies of Science!

No. V. 1676—1699.

La Géométric Françoise, ou la Pratique aisée....La quadracture du cercle. Par le Sieur de Beaulieu, Ingénieur, Géographe du Roi.... Paris, 1676, 8vo. [not Pontault de Beaulieu, the celebrated topographer; he died in 1674].

If this book had been a fair specimen, I might have pointed to it in connexion with contemporary English works, and made a scornful comparison. But it is not a fair specimen. Beaulieu was attached to the royal household, and throughout the century it may be suspected that the household forced a royal road to geometry. Fifty years before, Beaugrand, the king's secretary, made a fool of himself, and contrived to pass for a geometer. He had interest enough to get Desargues, the most powerful geometer of his time, the teacher and friend of Pascal, prohibited from lecturing. See some letters on the History of Perspective, which I wrote in the *Athenæum,* in October and November, 1861. Montucla, who does not seem to know the true secret of Beaugrand's greatness, describes him as "un certain M. de Beaugrand, mathématicien fort mal traité par Descartes, et à ce qu'il paroît avec justice."

Beaulieu's quadrature amounts to a geometrical construction which gives $\pi = \sqrt{10}$. His depth may be ascertained from the following extracts. First, on Copernicus:—

> "Copernic, Allemand, ne s'est pas moins rendu illustre par ses doctes écrits; et nous pourrions dire de luy, qu'il seroit le seul et unique en la force de ses Problèmes, si sa trop grande présomption ne l'avoit porté à avancer en cette Science une proposition aussi absurde, qu'elle est contre la Foy et raison, en faisant la circonférence d'un Cercle fixe, immobile, et le centre mobile, sur lequel principe Géometrique, il a avancé en son Traitté Astrologique le Soleil fixe, et la Terre mobile."

I digress here to point out that though our quadrators, &c., very often, and our historians sometimes, assert that men of the character of Copernicus, &c., were treated with contempt and abuse until their day of ascendancy came, nothing can be more incorrect. From Tycho Brahé to Beaulieu, there is but one expression of admiration for the genius of Copernicus. There is an exception, which, I believe, has been quite misunderstood. Maurolycus in his *De Sphæra,* written many years before its posthumous publication in 1575, speaking of the safety with which various authors may be read after his cautions, says, "Toleratur et Nicolaus Copernicus qui Solem fixum et Terram *in girum circumverti* posuit: et scutica potius, aut flagello, quam reprehensione dignus est." Maurolycus was a mild and somewhat contemptuous satirist, when expressing disapproval: as we should now say, he pooh-pooh-ed his opponents; but, unless the above be an instance, he was never savage nor impetuous. I am fully satisfied that the meaning of the sentence is, that Copernicus, who turned the earth like a boy's top, ought rather to have a whip given him wherewith to keep up his plaything than a serious refutation. To speak of *tolerating* a person *as being* more worthy of flogging than an argument, is almost a contradiction.

I will now extract Beaulieu's treatise on algebra, entire.

> "L'Algebre est la science curieuse des Sçavans, et specialement d'un General d'Armée ou Capitaine, pour promptement ranger une Armée en bataille, et nombre de Mousquetaires et Piquiers qui composent les bataillons d'icelle, outre les figures de l'Arithmetique. Cette science a 5 figures particuliares en cette sorte. P signifie *plus* au commerce, et à l'Armée *Piquiers.* M signifies *moins,* et *Mousquetaire* en l'Art des bataillons. R signifies *racine* en la mesure du Cube, et en l'Armée *rang.* Q signifie *quaré* en l'un et l'autre usage. C signifie *cube* en la mesure, et *Cavallerie* en la composition des bataillons et escadrons. Quant à l'operation de cette science, c'est d'additionner un *plus* d'avec *plus,* la somme sera *plus,* et *moins* d'avec *plus,* on soustrait le moindre du *plus,* et la reste est la somme requise ou nombre trouvé. Je dis seulement cecy en passant pour ceux qui n'en sçavent rient du tout."

This is the algebra of the Royal household, seventy-three years after the death of Vieta. Quære, is it possible that the fame of Vieta, who himself held very high stations in the household all his life, could have given people the notion that when such an officer chose to declare himself an algebraist, he must be one indeed? This would explain Beaugrand, Beaulieu, and all the *beaux.* Beaugrand—not only secretary to the king, but "mathematician" to the Duke of Orleans—I wonder what his "fool" could have been like, if indeed he kept the offices separate—would have been in my list if I had possessed his *Geostatique,* published about 1638. He makes bodies diminish in weight as they approach the earth, because the effect of a weight on a lever is less as it approaches the fulcrum.

Remarks upon two late ingenious discourses....By Dr. Henry More. London, 1676, 8vo.

In 1673 and 1675, Matthew Hale, then Chief Justice, published two tracts, an *Essay touching Gravitation,* and *Difficiles Nugæ* on the Torricellian experiment. Here are the answers by the learned and voluminous Henry More. The whole would be useful to anyone engaged in research about ante-Newtonian notions of gravitation.

Observations touching the principles of natural motions; and especially touching rarefaction and condensation.... By the author of *Difficiles Nugæ.* London, 1677, 8vo.

This is another tract of Chief Justice Hale, published the year after his death. The reader will remember that *motion*, in old philosophy, meant any change from state to state: what we now describe as *motion* was *local motion.* This is a very philosophical book, about *flux* and *materia prima, virtus activa* and *essentialis,* and other fundamentals. I think Stephen Hales, the author of the *Vegetable Statics,* has the writings of the Chief Justice sometimes attributed to him, which is very puny justice indeed.

Basil Valentine his triumphant Chariot of Antimony, with annotations of Theodore Kirkringius, M.D. With the true book of the learned Synesius, a Greek abbot, taken out of the Emperor's library, concerning the Philosopher's Stone. London, 1678, 8vo.

There are said to be three Hamburg editions of the collected works of Valentine, who discovered the common antimony, and is said to have given the name, *antimoine,* in a curious way. Finding that the pigs of his convent throve upon it, he gave it to his brethren, who died of it. The impulse given to chemistry by R. Boyle seems to have brought out a vast number of translations, as in the following tract.

Collectanea Chymica: A collection of ten several treasures in chymistry, concerning the liquor Alkahest, the Mercury of Philosophers, and other curiosities worthy the perusal. Written by Eir. Philaletha, Anonymus, J. B. Van-Helmont, Dr. Fr. Antonie, Bernhard Earl of Trevisan, Sir Geo. Ripley, Rog. Bacon, Geo. Starkie, Sir Hugh Platt, and the Tomb of Semiramis. See more in the contents. London, 1684, 8vo.

In the advertisements at the ends of these tracts there are upwards of a hundred English tracts, nearly all of the period, and most of them translations. Alchemy looks up since the chemists have found perfectly different substances composed of the same elements and proportions. It is true the chemists cannot yet *transmute;* but they may in time: they poke about most assiduously. It seems, then, that the conviction that alchemy *must* be impossible was a delusion: but we do not mention it.

The astrologers and the alchemists caught it in company in the following, of which I have an unreferenced note.

Mendacem et futilem hominem nominare qui volunt, calendariographum dicunt; at qui sceleratum simul ac impostorem, chimicum.

Crede ratem ventis, corpus ne crede chimistis;
Est quævis chimica tutior aura fide.

Among the smaller paradoxes of the day is that of the *Times* newspaper, which always spells it *chymistry:* but so, I believe, do Johnson, Walker and others. The Arabic word is very likely formed from the Greek: but it may be connected either with *χημεια* or with *χυμεια*.

Lettre d'un gentil-homme de province à une dame de qualité, sur le sujet de la Comète. Paris, 1681, 4to.

An opponent of astrology, whom I strongly suspect to have been one of the members of the Academy of Sciences under the name of a country gentleman, writes very good sense on the tremors excited by comets.

The Petitioning-Comet: or, a brief Chronology of all the famous Comets and their events, that have happened from the birth of Christ to this very day. Together with a modest inquiry into this present comet. London, 1681, 4to.

A satirical tract against cometic prophecy:—

"This present comet (it's true) is of a menacing aspect, but if the *new parliament* (for whose convention so many good men pray) continue long to sit, I fear not but the star will lose its virulence and malignancy, or at least its portent be averted from this our nation; which being the humble request to God of all good men, makes me thus entitle it, a Petitioning-Comet."

The following anecdote is new to me:—

"Queen Elizabeth (1558) being then at Richmond, and being disswaded from looking on a comet which did then appear, made answer, *jacta est alea*, the dice are thrown; thereby intimating that the pre-order'd providence of God was above the influence of any star or comet."

The argument was worth nothing: for the comet might have been *on the dice* with the event; the astrologers said no more, at least the more rational ones, who were about half of the whole.

An astrological and theological discourse upon this present great conjunction (the like whereof hath not (likely) been in some ages) ushered in by a great comet. London, 1682, 4to. By C. N.

The author foretells the approaching "sabbatical jubilee," but will not fix the date: he recounts the failures of his predecessors.

A judgment of the comet which became first generally visible to us in Dublin, December 13, about 15 minutes before 5 in the evening, A.D. 1680. By a person of quality. Dublin, 1682, 4to.

The author argues against cometic astrology with great ability.

A prophecy on the conjunction of Saturn and Jupiter in this present year 1682. With some prophetical predictions of what is likely to ensue therefrom in the year 1684. By John Case, Student in physic and astrology. London, 1682, 4to.

According to this writer, great conjunctions of Jupiter and Saturn occur "in the fiery trigon," about once in 800 years. Of these there are to be seven: six happened in the several times of Enoch, Noah, Moses, Solomon, Christ, Charlemagne. The seventh, which is to happen at "the lamb's marriage with the bride," seems to be that of 1682; but this is only vaguely hinted.

De Quadrature van de Circkel. By Jacob Marcelis. Amsterdam, 1698, 4to.

Ampliatie en demonstratie wegens de Quadrature....By Jacob Marcelis. Amsterdam, 1699, 4to.

Eenvoudig vertoog briev-wys geschrevem am J. Marcelis.. Amsterdam, 1702, 3to.

De sleutel en openinge van de quadrature....Amsterdam, 1704, 4to.

Who shall contradict Jacob Marcelis? He says the circumference contains the diameter exactly times

$$3\,\frac{1008449087377541679894282184894}{6997183637540819440035239271702}$$

But he does not come very near, as the young arithmetician will find.

Theologiæ Christianæ Principia Mathematica. Auctore Johanne Craig. London, 1699, 4to.

This is a celebrated speculation, and has been reprinted abroad, and seriously answered. Craig is known in the early history of fluxions, and was a good mathematician. He professed to calculate, on the hypothesis that the suspicions against historical evidence increase with the square of the time, how long it will take the evidence of Christianity to die out. He finds by formulæ, that had it been oral only, it would have gone out A.D. 800; but, by aid of the written evidence, it will last till A.D. 3150. At this period he places the second coming, which is deferred until the extinction of evidence, on the authority of the question "When the Son of Man cometh, shall he find faith on the earth?" It is a pity that Craig's theory was not adopted: it would have spared a hundred treatises on the end of the world, founded on no better knowledge than his, and many of them falsified by the event. The most recent (October, 1863) is a tract in proof of Louis Napoleon being Antichrist, the Beast, the eighth Head, &c.; and the present dispensation is to close soon after 1864.

In order rightly to judge Craig, who added speculations on the variations of pleasure and pain treated as functions of time, it is necessary to remember that in Newton's day the idea of force, as a quantity to be measured, and as following a law of variation, was very new: so likewise was that of probability, or belief, as an object of measurement. The success of the Principia of Newton put it into many heads to speculate about applying notions of quantity to other things not then brought under measurement. Craig imitated Newton's title, and evidently thought he was making a step in advance: but it is not every one who can plough with Samson's heifer.

No. VI. 1705—1747.

Copernicans of all sorts convicted. . . . to which is added a Treatise of the Magnet. By the Hon. Edw. Howard, of Berks. London, 1705, 8vo.

Not all the blood of all the Howards will gain respect for a writer who maintains that eclipses admit no possible explanation under the Copernican hypothesis, and who asks how a man can "go 200 yards to any place if the moving superficies of the earth does carry it from him?" Horace Walpole, at the beginning of his *Royal and Noble Authors*, has mottoed his book with the Cardinal's address to Ariosto, "Dove diavolo, Messer Ludovico, avete pigliato tante coglionerie? Walter Scott says you could hardly pick out, on any principle of selection—except badness itself, he means of course—the same number of plebeian authors whose works are so bad. But his implied satire on aristocratic writing forgets two points. First, during a large period of our history, when persons of rank condescended to write, they veiled themselves under "a person of honour," "person of quality," and the like, when not wholly undescribed. Not one of these has Walpole got; he omits, for instance, Lord Brounker's translation of Descartes on Music. Secondly, Walpole only takes the heads of houses: this cuts both ways; he equally eliminates the Hon. Robert Boyle and the precious Edward Howard. This last writer is hardly out of the time when aristocracy suppressed its names; the avowal was then usually meant to make the author's greatness useful to the book. In our day, literary peers and honourables are very favourably known, and contain an eminent class. They rough it like others, and if such a specimen as Edw. Howard were now to appear, he would be greeted with

> Hereditary noodle! knowest thou not,
> Who would be wise, himself must make him so?

A new and easy method to find the longitude at land or sea. London, 1710, 4to.

This tract is a little earlier than the great epoch of such publications (1714), and professes to find the longitude by the observed altitude of the moon and two stars.

A new method for discovering the longitude both at sea and land, humbly proposed to the consideration of the public. By Wm. Whiston and Humphrey Ditton. London, 1714, 8vo.

This is the celebrated tract, written by the two Arian heretics. Swift, whose orthodoxy was as undoubted as his meekness, wrote upon it the epigram—if, indeed, that be epigram of which the point is pious wish—which has been so often recited for the purity of its style, a purity which transcends modern printing. Perhaps some readers may think that Swift cared little for Whiston and Ditton, except as a chance hearing of their plan pointed them out as good marks. But it was not so: the clique had their eye on the guilty pair before the publication of the tract. The preface is dated July 7; and ten days afterwards Arbuthnot writes as follows to Swift:—

> "Whiston has at last published his project of the longitude; the most ridiculous thing that ever was thought on. But a pox on him! he has spoiled one of my papers of Scriblerus, which was a proposition for the longitude not very unlike his, to this purpose; that since there was no pole for east and west, that all the princes of Europe should join and build two prodigious poles, upon high mountains, with a vast lighthouse to serve for a polestar. I was thinking of a calculation of the time, charges, and dimensions. Now you must understand his project is by lighthouses, and explosion of bombs at a certain hour."

The plan was certainly impracticable; but Whiston and Ditton might have retorted that they were nearer to the longitude than their satirist to the kingdom of heaven, or even to a bishopric. Arbuthnot, I think, here and elsewhere, reveals himself as the calculator who kept Swift right in his proportions in the matter of the Lilliputians, Brobdignagians, &c. Swift was very ignorant about things connected with number. He writes to Stella that he has discovered that leap-year comes every four years, and that all his life he had thought it came every three years. Did he begin with the mistake of Cæsar's priests? Whether or no, when I find the person who did not understand leap-year inventing satellites of Mars in correct accordance with Kepler's third law, I feel sure he must have had help.

An essay concerning the late apparition in the heavens on the 6th of March. Proving by mathematical, logical, and moral arguments, that it cou'd not have been produced meerly by the ordinary course of nature, but must of necessity be a prodigy. Humbly offered to the consideration of the Royal Society. London, 1716, 8vo.

The prodigy, as described, was what we should call a very decided and unusual aurora borealis. The inference was, that men's sins were bringing on the end of the world. The author thinks that if one of the old "threatening prophets" were then alive, he would give "something like the following." I quote a few sentences of the notion which the author had of the way in which Ezekiel, for instance, would have addressed his Maker in the reign of George the First:—

> "Begin! Begin! O Sovereign, for once, with an effectual clap of thunder....O Deity! either thunder to us no more, or when you thunder, do it home, and strike with vengeance to the mark....'Tis not enough to raise a storm, unless you follow it with a blow, and the thunder without the bolt, signifies just nothing at all....Are then your lightnings of so short a sight, that they don't know how to hit, unless a mountain stands like a barrier in their way? Or perhaps so many eyes open in the firmament make you lose your aim when you shoot the arrow? Is it this? No! but, my dear Lord, it is your custom not to take hold of your arms till you have first bound round your majestic countenance with gathered mists and clouds."

The principles of the Philosophy of the Expansive and Contractive Forces....by Robert Greene, M.A., Fellow of Clare Hall. Cambridge, 1727, folio.

Sanderson writes to Jones: "The gentleman has been reputed mad for these two years last past, but never gave the world such ample testimony of it before." This was said of a former work of Greene's, on solid geometry, published in 1712, in which he gives a quadrature. He gives the same or another, I do not know which, in the present work, in which the circle is $3\frac{1}{5}$ diameters. This volume is of 981 good folio pages, and treats of all things, mental and material. The author is not at all mad, only wrong on many points. It is the weakness of the orthodox follower of any received system to impute insanity to the solitary dissentient: which is voted (in due time) a very wrong opinion about Copernicus, Columbus, or Galileo, but quite right about Robert Greene. If misconceptions, acted on by too much self-opinion, be sufficient evidence of madness, it would be a curious inquiry what is the least percentage of the reigning school which has been insane at any one time. Greene is one of the sources for Newton being led to think of gravitation by the fall of an apple: his authority is the gossip of Martin Folkes. Probably Folkes had it from Newton's niece, Mrs. Conduitt, whom Voltaire acknowledges as *his* authority. It is in the draft found among Conduitt's papers of memoranda to be sent to Fontenelle. But Fontenelle, though a great retailer of anecdote, does not mention it in his *éloge* of Newton; whence it may be suspected that it was left out in the copy forwarded to France. D'Israeli has got an improvement on the story: the apple "struck him a smart blow on the head": no doubt taking him just on the organ of causality. He was "surprised at the force of the stroke" from so small an apple: but then the apple had a mission; Homer would have said it was Minerva in the form of an apple. "This led him to consider the accelerating motion of falling bodies," which Galileo had settled long before: "from whence he deduced the principle of gravity," which many had considered before him, but no one had *deduced anything from it.* I cannot imagine whence D'Israeli got the rap on the head, I mean got it for Newton: this is very unlike his usual accounts of things. The story is pleasant and possible: its only defect is that various writings, well known to Newton, a very *learned* mathematician, had given more suggestion than a whole sack of apples could have done, if they had tumbled on that mighty head all at once. And Pemberton, speaking from Newton himself, says nothing more than that the idea of the moon being retained by the same force which causes the fall of bodies struck him for the first time while meditating in a garden. One particular tree at Woolsthorpe has been selected as the gallows of the apple-shaped goddess: it died in 1820, and Mr. Turnor kept the wood; but Sir D. Brewster brought away a bit of root in 1814, and must have had it on his conscience for 43 years that he may have killed the tree. Kepler's suggestion of gravitation with the inverse distance, and Bouilland's proposed substitution of the inverse square of the distance, are things which Newton knew better than his modern readers. I discovered two anagrams on his name, which are quite conclusive: the notion of gravitation was *not new;* but Newton *went on.* Some wandering spirit, probably, whose business it was to resent any liberty taken with Newton's name, put into the head of a friend of mine *eighty-one* anagrams on my own pair, some of which hit harder than any apple.

A treatise of the system of the world. By Sir Isaac Newton. Translated into English. London, 1728, 8vo.

I think I have a right to one little paradox of my own: I greatly doubt that Newton wrote this book. Castiglione, in his

Newtoni Opuscula, gives it in the Latin which appeared in 1731, not for the first time: he says *Angli omnes Newtono tribuunt.* It appeared just after Newton's death, without the name of any editor, or any allusion to Newton's recent departure, purporting to be that popular treatise which Newton, at the beginning of the third book of the Principia, says he wrote, intending it to be the third book. It is very possible that some observant turn-penny might construct such a treatise as this from the third book, that it might be ready for publication the moment Newton could not disown it. It has been treated with singular silence: the name of the editor has never been given. Rigaud mentions it without a word: I cannot find it in Brewster's *Newton,* nor in the *Biographia Britannica.* There is no copy in the Catalogue of the Royal Society's Library, either in English or Latin, except in Castiglione. I am open to correction; but I think nothing from Newton's acknowledged works will prove—as laid down in the suspected work—that he took Numa's temple of Vesta, with a central fire, to be intended to symbolize the sun as the centre of our system, in the Copernican sense.

(*To be continued.*)

Report on the Fifth International Statistical Congress, held at Berlin, Sept. 6th to 12th, 1863. *By* SAMUEL BROWN, F.S.S., *Vice-President of the Institute of Actuaries.*

FIVE meetings of the International Statistical Congress have now been held, and it cannot be denied, that, with the vast increase in commerce, and in the social relations of different countries, they continue to grow in interest and importance. The first Congress, which may be truly said to owe its origin to the exertions of, and was presided over by, that eminent writer and thinker, M. Quetelet, was held in Brussels, in 1853; the second in Paris, in 1855; the third in Vienna, in 1857; the fourth in London, in 1860. At the successful close of this last Congress, at which the lamented Prince Consort presided, and on the opening of which he delivered one of the most eloquent and philosophical discourses on the objects and advantages of statistical science which it has ever been our good fortune to hear, the place of meeting for the next Congress was debated. With the applause of the members present, the Rt. Hon. W. F. Cowper, Vice-President, being in the chair, suggested Berlin; and it was eventually left to the Committee of